WHAT IS CLAIMED IS:

1. A turbine component having a substrate formed from a ceramic material selected from the group consisting of a monolithic ceramic material and a composite ceramic material and a thermal barrier coating bonded to said substrate.

2. A turbine component according to claim 1, wherein said ceramic material comprises a monolithic ceramic material.

3. A turbine component according to claim 1, wherein said ceramic material is selected from the group of silicon nitride and self-reinforced silicon nitride.

4. A turbine component according to claim 1, wherein said ceramic material comprises a composite ceramic material.

5. A turbine component according to claim 1, wherein said ceramic material is selected from the group consisting of a silicon carbide-silicon carbide material and a carbon-carbon materials.

6. A turbine component according to claim 1, wherein said thermal barrier coating comprises at least 15 mol% of at least one lanthanide sesquioxide and the balance comprising a first oxide selected from the group consisting of zirconia, ceria, and hafnia.

7. A turbine component according to claim 6, wherein the first oxide is present in an amount greater than 50 mol%.

8. A turbine component according to claim 6, wherein the at least one lanthanide sesquioxide has a formula A_2O_3 where A is selected from the group consisting of La, Pr, Nd, Sm, Eu, Tb,

and mixtures thereof.

9. A turbine component according to claim 6, wherein said at least one lanthanide sesquioxide is present in a total amount in the range of 15 to 45 mol%.

10. A turbine component according to claim 6, wherein said at least one lanthanide sesquioxide is present in a total amount of at least 25 mol%.

11. A turbine component according to claim 6, wherein said first oxide is zirconia.

12. A turbine component according to claim 6, wherein said first oxide is hafnia.

13. A turbine component according to claim 6, wherein said first oxide is ceria.

14. A turbine component according to claim 1, wherein the thermal barrier coating comprises greater than 30 mol% Sc_2O_3, a lanthanide sesquioxide having a formula A_2O_3 where A is selected from the group consisting of Nd, Eu, Dy, Gd, Er, Pr, and mixtures thereof, and the balance zirconia.

15. A turbine component according to claim 14, wherein said zirconia is present in an amount greater than 40 mol%.

16. A turbine component according to claim 14, wherein said coating has less than 10 vol% of phases with a pyrochlore crystal structure.

17. A turbine component according to claim 14, wherein said lanthanide sesquioxide is present in an amount in the range of

from 0.001 to 30 mol%.

18. A turbine component according to claim 1, wherein the thermal barrier coating comprises more than 20 mol% In_2O_3, a lanthanide sesquioxide having a formula A_2O_3 where A is selected from the group consisting of Er, Nd, Eu, Dy, Gd, Pr, and mixtures thereof, and the balance zirconia.

19. A turbine component according to claim 18, wherein said zirconia is present in an amount greater than 40 mol%.

20. A turbine component according to claim 18, wherein said coating contains less than 10 vol% of phases with a pyrochlore crystal structure.

21. A turbine component according to claim 18, wherein said lanthanide sesquioxide is present in an amount from 0.001 to 40 mol%.

22. A turbine component according to claim 1, wherein the thermal barrier coating broadly comprises from 5 to 60 mol% of at least one of La_2O_3 and Sm_2O_3, and from 5 to 60 mol% of at least one oxide having a formula A_2O_3 where A is selected from the group consisting of Sc, In, Y, Pr, nd, Eu, Gd, Dy, Er, Yb, and mixtures thereof, and the balance zirconia.

23. A turbine component according to claim 22, wherein said zirconia is present in an amount greater than 40 mol%.

24. A turbine component according to claim 22, wherein said coating contains less than 10 vol% of phases with a pyrochlore crystal structure.

25. A turbine component according to claim 22, wherein the

thermal barrier coating comprises from 0.5 to 22.5 mol% of at least one first oxide having a formula A_2O_3 where A is selected from the group consisting of La, Sm, Tb, Tm, and Lu combined with a second oxide selected from the group consisting of zirconia, hafnia, and ceria.

26. A turbine component according to claim 25, wherein said second oxide is present in an amount of at least 77.5 mol%.

27. A turbine component according to claim 25, wherein said coating further comprises from 0.5 to 59.5 mol% of at least one oxide from the group consisting of In_2O_3, Sc_2O_3, Y_2O_3, MgO, CaO, and mixtures thereof and said second oxide being present in an amount greater than 40 mol%.

28. A turbine component according to claim 25, wherein said coating further comprises from 0.5 to 22.5 mol% of at least one third oxide selected from the group consisting of CeO_2, Pr_2O_3, Nd_2O_3, Eu_2O_3, Gd_2O_3, Dy_2O_3, Er_2O_3, Yb_2O_3, and mixtures thereof, and said at least one first oxide and said at least one third oxide being present in a total content less than 22.5 mol%.

29. A turbine component according to claim 1, wherein said coating comprises from 0.5 to 1.0 mol% of at least one first oxide from the group consisting of CeO_2, Pr_2O_3, Nd_2O_3, Eu_2O_3, Gd_2O_3, Dy_2O_3, Er_2O_3, Yb_2O_3, In_2O_3, Sc_2O_3, Y_2O_3, and mixtures thereof, combined with a second oxide selected from the group consisting of zirconia, hafnia, and ceria.

30. A turbine component according to claim 29, further comprising from 0.5 to 22.5 mol% of at least one third oxide selected from the group consisting of La_2O_3, Sm_2O_3, Tb_2O_3, Tm_2O_3, Ho_2O_3, Lu_2O_3, MgO, CaO, and mixtures thereof, said at least one

first oxide and said at least one third oxide being present in a total amount of less than 22.5 mol%, and said second oxide being present in an amount of at least 77.5 mol%.

31. A turbine component according to claim 1, wherein the thermal barrier coating comprises from 20.5 to 22.5 mol% of CeO_2 combined with an oxide selected from the group consisting of zirconia, hafnia, and ceria.

32. A turbine component according to claim 31, wherein said oxide is present in an amount of at least 77.5 mol%.

33. A turbine component according to claim 1, wherein said thermal barrier coating comprises from 0.5 to 22.0 mol% of CeO_2, and from 0.5 to 22.0 mol% of at least one first oxide selected from the group consisting of La_2O_3, Sm_2O_3, Tb_2O_3, Tm_2O_3, Ho_2O_3, Lu_2O_3, MgO, CaO, Pr_2O_3, Nd_2O_3, Eu_2O_3, Gd_2O_3, Dy_2O_3, Er_2O_3, Yb_2O_3, and mixtures thereof, combined with a second oxide selected from the group consisting of zirconia and hafnia, and said CeO_2 and the at least one first oxide being present in an amount no greater than 22.5 mol%.

34. A turbine component according to claim 33, wherein said second oxide is present in an amount of at least 77.5 mol%.

35. A turbine component according to claim 1, wherein said thermal barrier coating broadly comprises from 0.5 to 22.5 mol% CeO_2, from 0.5 to 59.5 mol% of at least one oxide selected from the group consisting of In_2O_3, Sc_2O_3, and mixtures thereof, combined with at least 40 mol% of an oxide selected from the group consisting of zirconia and hafnia.

36. A turbine component according to claim 1, wherein said thermal barrier coating comprises from 9.0 to 22.5 mol% of at

least one first oxide selected from the group consisting of Pr_2O_3, Nd_2O_3, Eu_2O_3, Er_2O_3, and mixtures thereof, combined with a second oxide selected from the group consisting of zirconia, hafnia, and ceria.

37. A turbine component according to claim 36, wherein said second oxide is present in an amount greater than 77.5 mol%.

38. A turbine component according to claim 36, wherein said thermal barrier coating further comprises from 0.5 to 51 mol% of at least one third oxide selected from the group consisting of Yb_2O_3, In_2O_3, Sc_2O_3, Y_2O_3, Gd_2O_3, MgO, CaO, and mixtures thereof and said second oxide being present in an amount of at least 40 mol%.

39. A turbine component according to claim 1, wherein said thermal barrier coating comprises from 15.0 to 22.5 mol% of a first oxide selected from the group consisting of Dy_2O_3 and Yb_2O_3 combined with at least 77.5 mol% of a second oxide selected from the group consisting of zirconia, hafnia, and ceria.

40. A turbine component according to claim 1, wherein said thermal barrier coating comprises from 0.5 to 59.5 mol% of Dy_2O_3 and from 0.5 to 59.5 mol% of at least one oxide from the group consisting of In_2O_3, Sc_2O_3, MgO, CaO, and mixtures thereof, combined with at least 40 mol% of an oxide selected from the group consisting of zirconia, hafnia, and ceria.

41. A turbine component according to claim 1, wherein said thermal barrier coating comprises from 0.5 to 22.5 mol% of Yb_2O_3 and from 0.5 to 59.5 mol% of at least one oxide from the group consisting of In_2O_3, Sc_2O_3, MgO, CaO, and mixtures thereof, combined with at least 40 mol% of an oxide selected

from the group consisting of zirconia, hafnia, and ceria.

42. A turbine component according to claim 1, wherein said thermal barrier coating comprises from 20.5 to 60 mol% of at least one oxide selected from the group consisting of In_2O_3, Sc_2O_3, MgO, CaO, and mixtures thereof, combined with at least 40 mol% of an oxide selected from the group consisting of zirconia, hafnia, and ceria.

43. A turbine component according to claim 1, wherein said thermal barrier coating comprises from 15 to 59.5 mol% of Y_2O_3, from 0.5 to 45.0 mol% of at least one first oxide selected from the group consisting of La_2O_3, Sm_2O_3, Tb_2O_3, Tm_2O_3, Ho_2O_3, Lu_2O_3, MgO, CaO, Pr_2O_3, Nd_2O_3, Eu_2O_3, Dy_2O_3, Er_2O_3, Yb_2O_3, In_2O_3, Sc_2O_3, and mixtures thereof, combined with at least 40 mol% of an oxide selected from the group consisting of zirconia, hafnia, and ceria.

44. A turbine component according to claim 1, wherein said thermal barrier coating comprises from 9.0 to 23.0 mol% Gd_2O_3, from 0.5 to 51.0 mol% of at least one first oxide selected from the group consisting of La_2O_3, Sm_2O_3, Tb_2O_3, Tm_2O_3, Ho_2O_3, Lu_2O_3, MgO, CaO, Pr_2O_3, Nd_2O_3, Eu_2O_3, Dy_2O_3, Er_2O_3, Yb_2O_3, In_2O_3, Sc_2O_3, and mixtures thereof, combined with at least 40 mol% of an oxide selected from the group consisting of zirconia, hafnia, and ceria.

45. A turbine component according to claim 1, further comprising at least one bond coat layer between said substrate and said thermal barrier coating, and said at least one bond coat layer providing coefficient of thermal expansion matching, oxidation resistance and corrosion resistance.

46. A turbine component according to claim 45, wherein said at

least one bond coat layer is formed from Ta_2O_5.

47. A turbine component according to claim 45, wherein said at least one bond coat layer is formed from a rare-earth disilicate having the formula $X_2Si_2O_7$ where X is selected from the group consisting of La, Nd, Pr, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, and Lu.

48. A turbine component according to claim 45, wherein said at least one bond coat layer comprises $Y_2Si_2O_7$.

49. A turbine component according to claim 45, wherein said at least one bond coat layer comprises mullite.

50. A turbine component according to claim 45, wherein said at least one bond coat layer comprises barium strontium alumino silicate.

51. A turbine component according to claim 45, wherein said at least one bond coat layer comprises yttrium aluminum garnet.

52. A turbine component according to claim 45, wherein said at least one bond coat layer comprises ytterbium aluminum garnet.

53. A turbine component according to claim 45, wherein said at least one bond coat layer comprises rare-earth aluminate garnets wherein the rare earth is selected from the group consisting of Gd, Tb, Dy, Ho, Er, Tm, Lu, and mixtures thereof.

54. A turbine component according to claim 45, wherein said bond coat is formed from a plurality of distinct layers.

55. A turbine component according to claim 45, wherein said

bond coat is formed from a plurality of functionally graded layers.